**Assessment of Air Quality in the Space Shuttle**
**Based on Samples Returned aboard STS-109 in March 2002**

The toxicological assessment of grab sample canisters (GSCs) returned aboard STS-109 is reported. Analytical methods have not changed from earlier reports, and surrogate standard recoveries from the GSCs were 83-113%. Pressure tracking indicated no leaks in the canisters.

The two general criteria used to assess air quality are the total-non-methane-volatile organic hydrocarbons (NMVOCs) and the total T-value (minus the $CO_2$ contribution). Control of atmospheric alcohols is important to ISS water recovery system engineers, and for reference, total alcohols are also shown for each sample. Formaldehyde was not quantified during this flight. These indices of air quality are summarized below:

| Sample Location | Date/Type | NMVOCs ($mg/m^3$) | T Value[a] (units) | Alcohols ($mg/m^3$) | Formaldehyde ($mg/m^3$) |
|---|---|---|---|---|---|
| Preflight | 3/1/02 | 0.35 | 0.08 | 0.0 | ns[a] |
| Middeck | MET 10/16:12 | 4.1 | 0.98 | 1.3 | ns |
| Trip Control | not applicable | 0.30 | 0.13 | 0.0 | ns |

[a] No sample was taken.

The T values for the preflight and trip controls were very low, as expected. The T value for the middeck sample was unusually high; this was primarily due to an unusual concentration of carbon monoxide of 9.4 $mg/m^3$, which resulted in a T contribution of 0.85. The source of carbon monoxide could not be identified.

Overall, the air quality was acceptable for human respiration; however, the unusual concentration of carbon monoxide needs to be investigated.

Enclosures

Table 1: Analytical Results of STS-109 GSC Air Samples-Concentrations
Table 2: Analytical Results of STS-109 GSC Air Samples-T Values Using 7-day SMACs